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24-HOUR THERMAL STRUCTURE AND SOUND SPEED FORECASTS FOR SPECIFI--ETC(U)
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24-HOUR THERMAL STRUCTURE AND SOUND SPEED FORECASTS FOR SPECIFIC LOCATIONS IN THE EASTERN PACIFIC

Fleet Numerical Weather Facility, Monterey

and

Fleet Weather Central, Alameda

(9) Technical Memo. No. 7

(11) 15 March 1965

(12) 71

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Background

The U.S. Fleet Numerical Weather Facility, Monterey, in cooperation with Fleet Weather Central, Alameda, will be issuing daily 24-hour thermal structure and sound speed profile forecasts for specific locations in the Eastern Pacific, commencing about 22 March 1965.

This project is developmental in nature. In the beginning it utilizes a combination of subjective (manual) and objective (computer) methods. In about two months it will be entirely computerized. FNWF, Monterey and FWC, Alameda would appreciate receiving comments on accuracy and usefulness, and any suggestions for improvement.

Positions of the profiles:

The positions of the forecasted profiles and their code numbers will be distributed through classified channels. The structure between these points can be roughly interpolated. A horizontal analysis and forecast of MLD (top of thermocline) for the whole North Pacific is in preparation and is scheduled to be operational by 1 May 1965 together with an analysis and forecast of transient thermocline ("afternoon effect") probability and their gradients. These charts will facilitate the interpolation of subsurface thermal and sound speed structures between the points.

Basis and principles of the forecast:

The forecast is based mainly on the following data and current quantitative knowledge of the following processes:

(1) Hydroclime (climatology) of subsurface thermal struc
(2) Sea surface temperature analysis and forecast (the latter based on advection and heat exchange considerations).
(3) Mixing by wave action.
(4) Effects of convergences and divergences.
(5) Heat exchange between the sea and the atmosphere.

The values of the influencing elements and forces are taken from FNWF sea, surface current and other forecasts. The accuracy of the forecasts is effected by:

(1) Accuracy and applicability of existing quantitative knowledge of the determining processes.

(2) Accuracy of weather forecasts.

(3) Effects of small-scale disturbances.

At present, disturbances such as inertial eddies and internal waves (e.g., with tidal period) are difficult to forecast and/or to include into the present forecasting scheme.

Sound speed profile forecasts will be based on the temperature profile forecast and seasonal salinity profile. The transmission of this profile will commence later (31 March 1965 or as soon as the computer program is finished).

Transmission:

Fleet Weather Central, Alameda, will accomplish distribution via radio teletype and facsimile as follows:

a. radio teletype: as available after 2322Z.

b. radio facsimile: transmitted as two charts of six graphs each. Each chart will be transmitted during a scheduled period (after 2300Z) when "available satellite charts" are not available for transmission. Formats and codes are described in detail in this memorandum.

Codes for transmission of thermal structure and sound speed profile forecasts for the Eastern Pacific.

I. Thermal structure profile (TSP)

1) 24 hr BT FCST FROM _____Z.

2) LL

LL - Number of the position (01 to 12). See Enclosure 2 (Classified).

3) 00TTT

00 - Surface identifier

TTT - Surface temperature in tenths of °F.

4) Z_3Z_3TTT

Z_3Z_3 - Average depth of the top of thermocline in tens of feet.

TTT - Temperature at the top (upper boundary) of the thermocline °F and tenths.

5) Z_4Z_4TTT ----------etc.

Z_4Z_4 - Depth (at hundred foot intervals in tens of feet) according to following scheme: 100, 200, 300, 400, 600 and 800 feet, provided the 100 foot level is deeper than the thermocline.

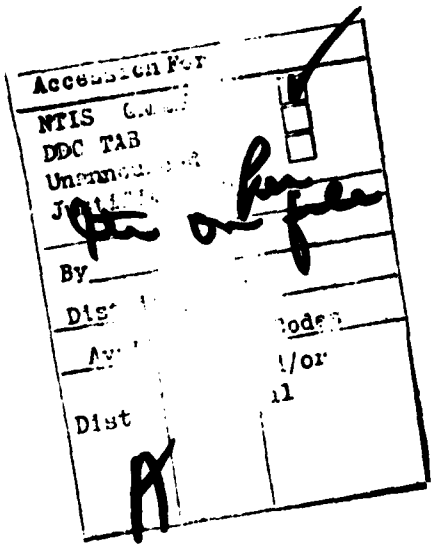
6) $TZ_1Z_1P_1T_1$ - This is an optional group for transients. This might be omitted or repeated if several transient thermoclines are expected. No more than two will be forecast.

T - Identifier for transient thermoclines.

Z_1Z_1 - Depth of the transient thermoclines in feet.

P_1 - Code for the probability of occurrence of the transient thermoclines (diurnal thermoclines or "afternoon effects").

Code Number	Probability of occurrence in %
0	None
1	1-24%
2	25-49%
3	50-74%
4	75-99%
5	100%



T_1 - Code for the magnitude of the transient thermoclines and/or the temperature difference between the sea surface and top of the thermocline.

Code Number	Temperature difference in °F
0	$< 0.3^{\circ}F$
3	$> 0.3^{\circ} \leq 0.6^{\circ}F$
6	$> 0.6^{\circ}F$

7) $PP_2M_dZ_2Z_2$ - Optional

P - Identifier

P_2 - Probability of the persistence of the transient thermocline throughout the night and into next day.

Code Number	Probability of persistence (in %) and other criteria
0	No transients, or persistency less than 25%
1	Transient(s) persistency 25 to 49%
2	Transient(s) persistency 50 to 74%
3	Transient(s) persistency 75 to 100%
4	Only deeper (second) transient persists with 25 to 49%
5	Only deeper (second) transient persists with 50 to 74%
6	Only deeper (second) transient persists with 75 to 100%
7	The persistency of upper (first) transient 25 to 49% The persistency of lower (second) transient 50 to 74%
8	The persistency of upper (first) transient 25 to 49% The persistency of lower (second) transient 75 to 100%
9	The persistency of upper (first) transient 50 to 74% The persistency of lower (second) transient 75 to 100%

M_d - Code of the expected tendency of the change of average depth of the thermocline and the nature of the thermocline.

Code Number	Tendency criteria and thermocline nature description
0	Little or no change of average thermocline depth.
1	Several ± fluctuations > 15.
2	Small fall < 15 feet.
3	Large fall > 15 feet.
4	Small rise < 15 feet.
5	Large rise > 15 feet.
6	Inflection point (upper boundary of thermocline) becoming sharper.
7	Upper boundary becoming less distinct.
8	Exact thermocline depth difficult to ascertain because of gradual change (continuous density model) and other reasons
9	Thermocline fluctuations difficult to ascertain.

Z_2Z_2 - Magnitude of short-term fluctuations of the depth of the main thermocline in feet (caused by internal waves and other factors).

Note: The facsimile chart contains a crossing bar on the temperature - depth trace with an identifying letter T and with the code numbers of probability of occurrence (P_1), probability of persistence (P_2) and gradient (T_1). The average depth of the thermocline is likewise identified with a crossing bar, identifying letter P and code number for thermocline nature and tendency (M_d) and the ± fluctuation range will be printed out.

II. Sound speed profile

1) 24 H. SV FCST - Identifying group.

2) LLYGG - Same as in TSP code above.

3) 00VVV

00 - Surface identifier.

VVV - Sound speed in feet per second, omitting the thousand digit (4 or 5).

4) ZZVVV - Depth of the transient and sound speed at the top of the transient.

5) ZZVVV - Depth of the transient (as above) and sound speed at the bottom of the transient.

6) ZZVVV - Depth of the maximum sound speed and the actual speed.

7) ZZVVV - Depth and sound speed at 100 foot intervals as in TSP code above.